USDA FOREST SERVICE RESEARCH PAPER PNW-174
PNW 310.1 1974

VENEER YIELDS BY THE NEW TIMBER CRUISING GRADES FOR OLD-GROWTH COAST DOUGLAS-FIR

Richard O. Woodfin, Jr.

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
PORTLAND, OREGON

SUMMARY

The new timber cruising grades can be used by timber purchasers and mill operators to estimate veneer grade yield percentages. Figures of curved veneer grade recovery and tables of uncurved average recovery values are presented for the logs used in the log grade development analysis.

The amount of veneer recovered per unit of log input in this sample increased with higher grade logs; recovery ratio increased from 2.02 for grade No. 4 logs to 2.93 for grade No. 1 logs.

There is a strong relationship between the grade of a log and the veneer grades recovered. Tables are provided for estimating veneer grade recovery percentages.

Relationship of new grades to present grades can be determined from log grade distribution tables.

An example is presented of how to estimate veneer grade yield from cubic volumes.

KEYWORDS: Douglas-fir, veneer/plywood mill products, log grading, cruising (forest).

ACKNOWLEDGMENTS

The information presented in this paper was obtained through the cooperation and assistance of many people. Major cooperators were:

International Paper Company
U. S. Plywood-Champion Papers, Inc.
Three Rivers Plywood and Timber Company
Simpson Timber Company
Timber Products Company
Carolina-California Plywood, Inc.
Publishers Paper Company
Bohemia Lumber Company, Inc.
American Plywood Association
Timber Engineering Company
U. S. Department of Agriculture
  Region 5, Forest Service
  Region 6, Forest Service
U. S. Department of the Interior
  Bureau of Land Management
  Bureau of Indian Affairs

CONTENTS

INTRODUCTION

This paper presents veneer recovery information by the new timber cruising grades (*3, 5*) developed for old-growth Coast Douglas-fir. The new log grades were developed by analysis of the recovery data and timber characteristics from a series of 10 lumber and veneer recovery studies in west-side Washington, Oregon, and California. Timber quality characteristics and yields of lumber and veneer were measured from more than 1,000 trees throughout the Douglas-fir region of these States. About one-fourth of these trees were processed at the 10 veneer mills.

An adequate log or tree grading system for a given species is developed from analytical studies of timber characteristics and their relationship to end product yields and values. The new log grading system for Douglas-fir, on which these recovery data are based, is that type of system.

Recent publications (*4, 6*) give lumber and veneer yields based on the present Forest Service sawmill log-peeler log grading criteria for Douglas-fir.

The study trees were selected to be representative in size and quality of west-side commercial Douglas-fir timber. Logs from these trees were not intended to be representative of the typical log mix at a mill.

Logs were bucked, sawn, and peeled according to normal practice at each study mill. Public agency check scalers or scaling supervisors scaled all study logs according to uniform Bureau rules.[1/] These rules are described as Forest Service instructions for west-side log scaling and grading. The lumber was graded by, or under the direct supervision of, a quality supervisor of the Western Wood Products Association, West Coast Lumber Inspection Bureau, or the Pacific Lumber Inspection Bureau. All veneer was graded by, or under the supervision of, the American Plywood Association or the Timber Engineering Company quality supervisors.

RECOVERY BASIS

Recovery data for dry, untrimmed veneer are presented on the short log or two-block basis. This approximates the Forest Service cruise log length where grades are based on multiples of 16 feet through the first three 32-foot logs. Each tree was graded in multiples of the actual two-peeler-block log. Because of broken or cull segments and odd numbers of blocks per tree, an occasional log length is 8 feet or 26 feet (one or three blocks per log).

[1/] Bureau rules as contained in the Columbia River Log Scaling and Grading Rules Book or the Official Log Scaling and Grading Rules Book used by all other Bureaus depending upon location.

A diagram of size, position, and type of all surface characteristics was prepared for each study log. Existing and trial grading specifications were applied to diagrams to determine the grade of each log. Upon completion of the development and testing of the grading system, the study logs were graded by applying the final specifications to these diagrams.

FELLING AND BUCKING

The study trees were felled and bucked into logs following practices similar to those of each cooperating mill. Trees designated for the veneer sample were bucked into multiples of 8-foot peeler blocks. Each log was tagged to identify its origin as to sample area, tree number, and position in the tree. This identification was maintained throughout the data collection and analysis phases. The logs from each entire veneer sample tree were usually sent to the veneer mill. Limitations placed on blocks bucked for peeling were diameters large enough and blocks sound enough to be held in the lathe chucks.

VENEER PEELING AND TALLYING

The study logs were peeled under nearly normal production conditions. Equipment, manufacturing methods, and product output in the 10 sample mills were representative of general industry practices in the west-side Douglas-fir region. Mill equipment generally included an 8-foot lathe with retractable chucks, core saw, clippers, one to three veneer dryers, and associated panel layup equipment.

Blocks were peeled and veneer was clipped to recover the optimum value of each log within the cooperating mills' normal manufacturing procedures for producing standard veneer items. Log identity was maintained on each piece of veneer throughout the manufacturing process from lathe to dry veneer grading and tallying.

Veneer items produced were graded: A, A patch (maximum of 14 patches per 4- by 8-foot sheet), B, B patch (maximum of 20 patches per 4- by 8-foot sheet), C, or D.

COMPILATION OF DATA

The amount of dry, untrimmed veneer recovered from a peeled block was determined by a count of full and half sheets and actual width measurement of each piece of 8-foot random strip, 4-foot core, or fishtail veneer. An average, untrimmed, dry veneer width and thickness were determined for each mill from sample measurements taken during each study. These measurements were used to calculate cubic- and square-foot volumes. The combination of volumes of random width strips and half and full sheets gives the veneer recovery of each block.

This veneer grade tally for the peeled blocks is expressed on a square-foot,

3/8-inch basis. Cubic volumes are presented for each block and for the total of A, B, C, and D grade veneer, core, below grade veneer, and residue components of the block. Cubic volumes of individual peeler block were summed for log volume. The cubic block volume was computed by the formula:

$$\text{Cubic volume} = 0.001818\, L \quad (D_S^2 + D_S\, D_L + D_L^2)$$

where 0.001818 is a constant

L is the actual block length in feet

D_S is the average small end block diameter in inches

D_L is the average large end block diameter in inches.

Residue volume was obtained by subtracting the veneer, core, and below grade veneer volumes from the block volume. The residue total includes spur, roundup loss, green clipper loss, and shrinkage (*7*).

Veneer grade yield for the logs was obtained by combining veneer recovery from all blocks of the log.

DISCUSSION OF RESULTS

LOG SCALE AND PERCENT DEFECT

The 1,484 logs in this study averaged 25.5 inches in diameter and 17 feet in scaling length. All logs were at least one-third sound as determined by the scaler in accordance with practices in use in the west-side Douglas-fir region. Figure 1 shows the relationship of percent defect to diameter for all logs. The increased defect expected from larger diameter logs is evident in figure 1. The average gross and net scales for logs in each grade are shown in table 1.

The average defect percentages for the sample No. 1 through No. 4 logs were 12.0, 10.8, 9.3, and 14.5 percent, respectively. Defect was lowest for the No. 3 logs, which are usually the small diameter upper logs. The reader should recognize that the defect percentages by log grades applies to this mix of log sizes and soundness. They do not establish defect levels for the respective log grades. There was no significant difference (5-percent level) in defect percentage between the four log grades.

VENEER RECOVERY RATIO

The uncurved recovery ratios for each log grade diameter class are presented in appendix tables 2 to 6. Veneer recovery ratio is the estimate of square feet of veneer, 3/8-inch basis, per board foot of scale and is based on the net log scale and square feet of dry, *untrimmed* veneer produced from the log. The reader should make a reduction of approximately 16 percent (*2*) to estimate trimmed panel recovery(s). This reflects the industry practice of basing recovery ratio on the trimmed panel.

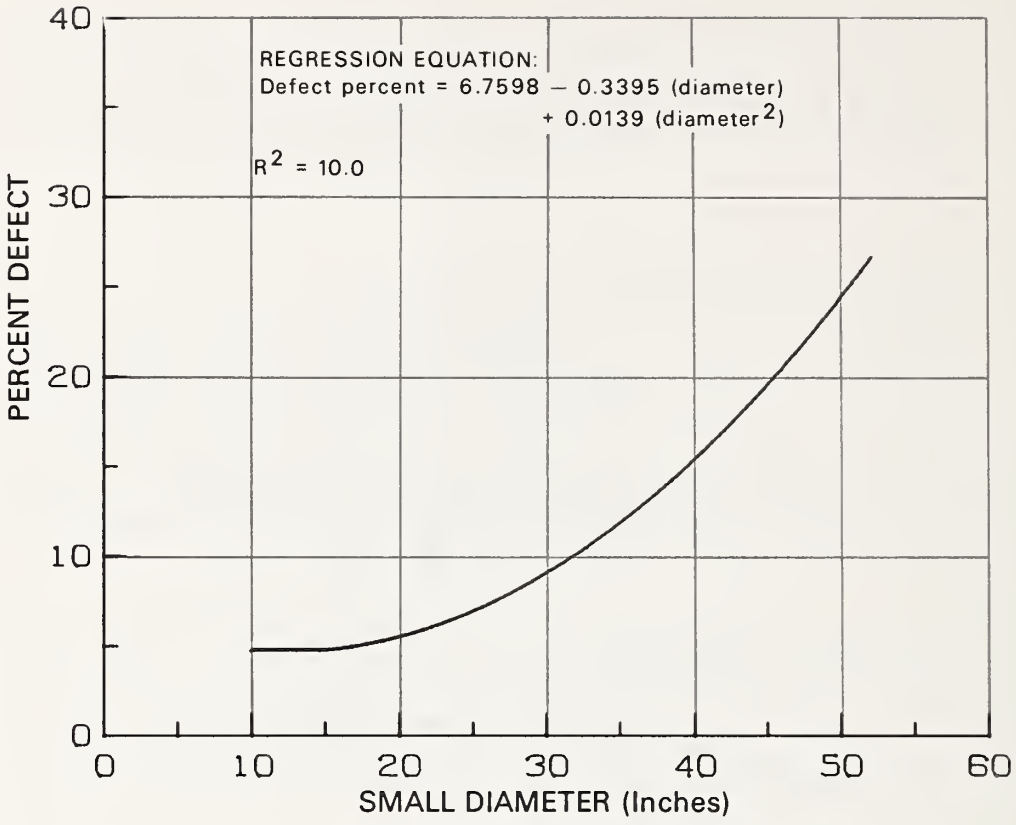


Figure 1.--Percent defect by small diameter for all logs.

Table 1.—Summary of log recovery, volume, and defect by grades

Item	Log grade				All logs
	1	2	3	4	
Total study veneer recovered by log grade - - - - - - - - - - percent	21.6	30.1	32.9	15.0	100.0
Veneer recovery ratio[1/]	2.93	2.89	2.66	2.02	2.65
Total cubic recovery in--					
Veneer grades A, B, C, D - - - percent	58.4	58.0	54.0	37.8	52.5
Below grade veneer - - - - - - percent	.9	1.9	6.4	13.9	5.7
Core - - - - - - - - - - - - - percent	8.0	8.9	10.2	11.0	9.6
Residue - - - - - - - - - - - - percent	32.7	31.2	29.4	37.3	32.2
Number of logs	207	371	563	343	1,484
Average log diameter - - - - - - - inches	30.6	27.2	23.6	23.8	25.5
Average gross log scale - - - board feet	802	634	478	503	568
Average net log scale - - - - board feet	706	565	434	430	504
Average defect - - - - - - - - - - percent	12.0	10.8	9.3	14.5	11.3

[1/] Square feet of dry, untrimmed veneer (3/8-inch basis) per board foot of net log scale.

CUBIC RECOVERY PERCENTAGE

Interest is increasing in the forest products industry for use of cubic recovery estimates of product recovery rather than recovery estimates from log scaling. Appendix tables 2 to 6 give total cubic volumes for the study sample of logs and the veneer recovered. These are uncurved values. In figures 2 and 3, expressions of recovery are presented as ratios that use cubic feet. They show, respectively, for this sample the relationships of cubic feet of dry, untrimmed veneer and square feet of dry, untrimmed veneer recovered per cubic foot of log volume by small diameter.

Figures 2 and 3 show separate curves of recovery for each log grade and all grades combined. There is no significant difference between the curves for grades 1 and 2 in either figure. Also, only the average is shown for grade 4 in both figures. The following tabulation of log grades shows the regression coefficient (R^2 values) for both figures:

Log grade	Figure 2	Figure 3
	----- R^2 values -----	
No. 1	40.1	43.1
No. 2	50.9	48.7
No. 3	77.4	75.4
No. 4	(2/)	(2/)
All grades	16.7	16.0

The recovery curves in figures 2 and 3 and the defect curve in figure 1 closely reflect a pattern of theoretical veneer recovery shown by Bruce (*1*). In figure 6 of his report, he shows a certain minimum volume of wood required to produce a veneer core. The percentage of the block left in the core is greatest in small diameter blocks. It is fairly constant in larger blocks, those over 20 inches in diameter. Therefore, when defect increases in larger blocks as shown in figure 1, the result is larger cores left from peeling the larger blocks. This in effect reduces the veneer recovery from the larger blocks. As shown in figures 2 and 3, the yield of veneer, whether expressed as cubic feet or square feet per cubic foot of block volume, drops off for the larger diameters.

DISTRIBUTION OF VENEER ITEMS

Mills in these studies peeled one or more veneer thicknesses--1/10-, 1/8-, and 1/5-inch. The 1/10-inch veneer accounted for 87 percent of the total volume and the 1/8- and 1/5-inch accounted for 11 percent and 2 percent, respectively. The entire volume of 1/5-inch veneer was produced as half sheets, approximately 26 by 101 inches, green size.

2/ Curve not significant, average plotted.

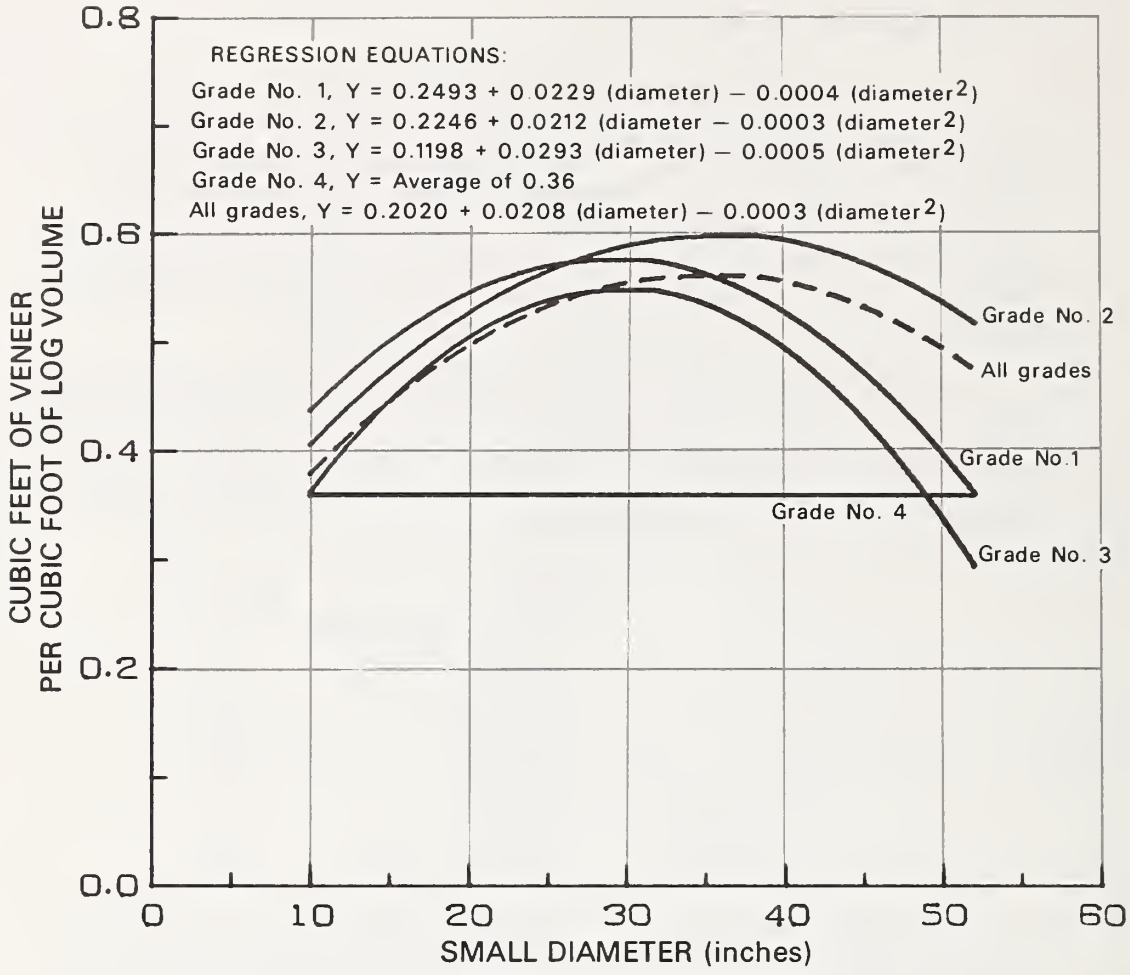


Figure 2.--Ratio of cubic feet of veneer volume per cubic foot of log volume by small diameter for each log grade.

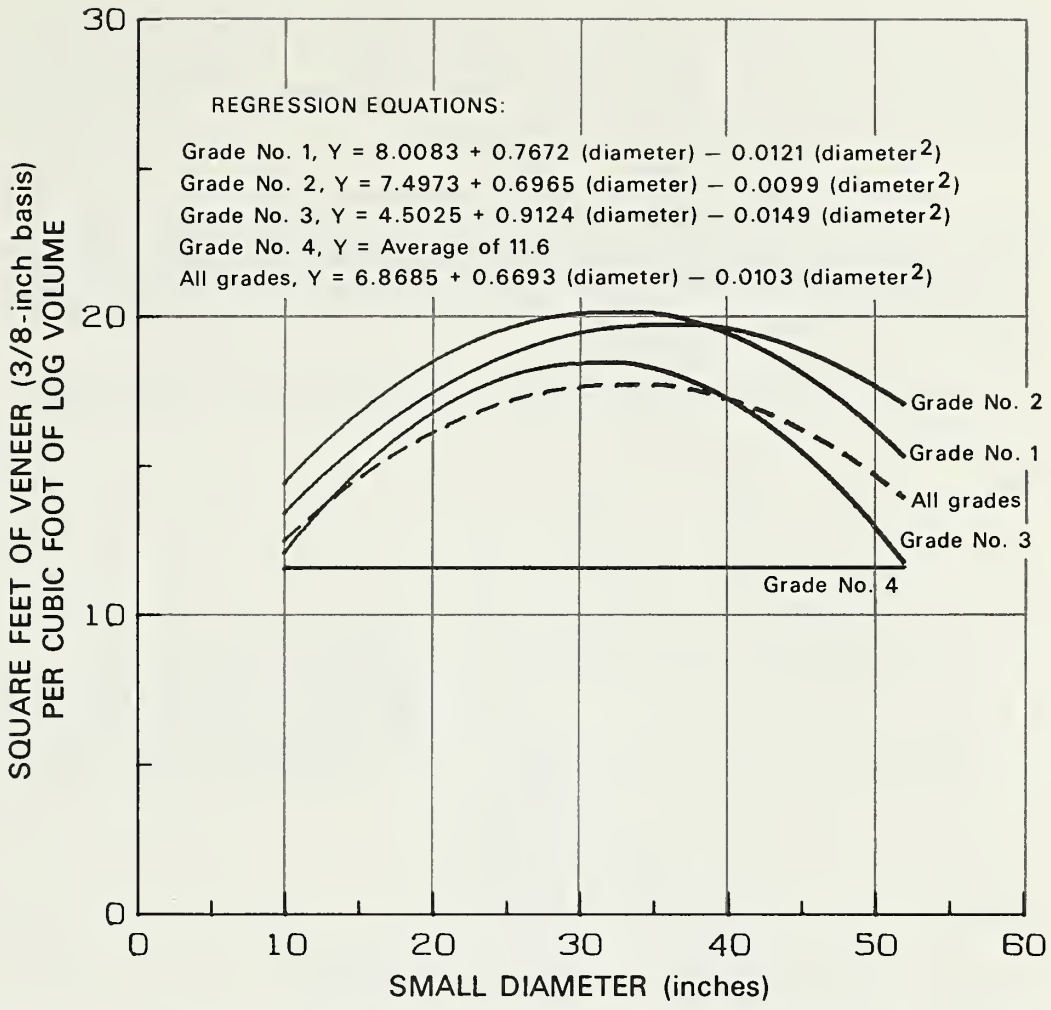


Figure 3.--Ratio of square feet of dry, untrimmed veneer (3/8-inch basis) per cubic foot of log volume by small diameter for each log grade.

Full sheets of veneer represented 39.5 percent of the study volume with all but 4.2 percent in the 1/10-inch thickness (table 11). Half sheets made up 29.8 percent of the total study volume; random width, 8-foot strips--24.3 percent; and short core or fishtail veneer, 6.4 percent.

Thicker veneers were peeled in greatest volume from the lower grade logs. Only 4.2 percent of the veneer volume from No. 1 logs was 1/8-inch thick, but 18.4 percent of the No. 4 log volume was peeled into 1/8-inch veneer. Over 52 percent of the 1/5-inch veneer came from No. 3 logs alone with 98.6 percent from Nos. 2, 3, and 4 logs combined.

Distribution of veneer volume by log grade and number of logs is shown in figure 4.

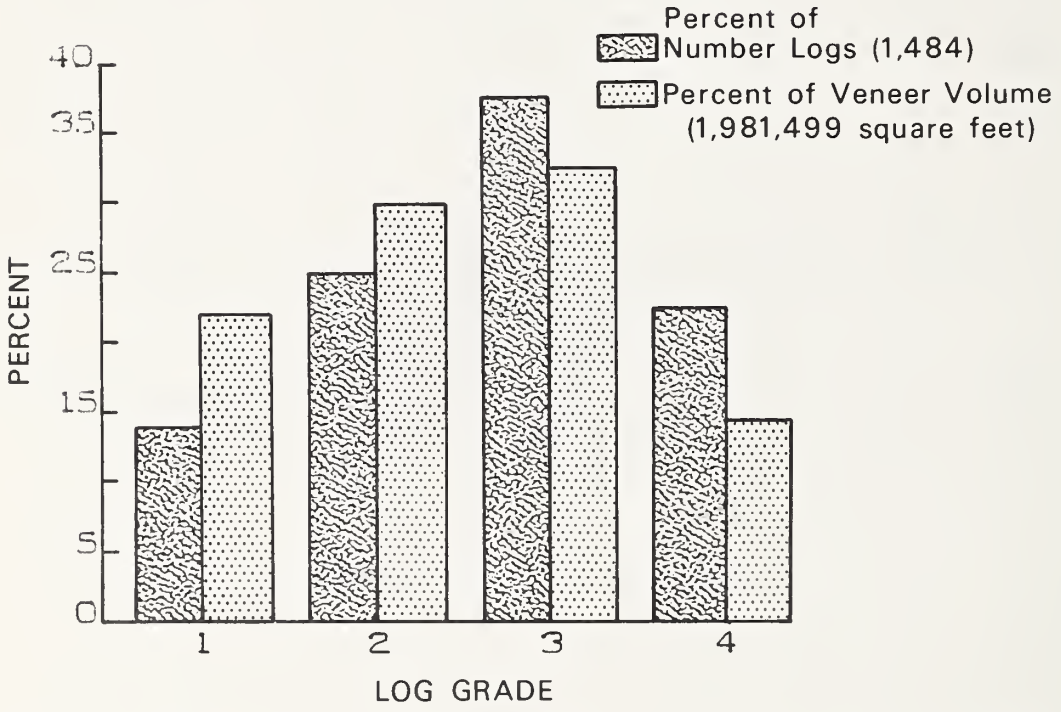


Figure 4.--Distribution of veneer volume and number of logs by log grade.

Appendix tables 7 to 11 detail the distribution of veneer grades and items by thickness for each log grade. The decrease in amount of upper grade veneer from No. 1 to No. 4 logs can be tabulated from these tables. For example, the following were summarized from full sheet and random width 8-foot-strip entries in tables 7 to 11:

This tabulation shows that 85 percent of the 1/8-inch full sheet veneer from No. 1 logs was B patch and higher grades (table 7). In contrast, only 19 percent (2 percent A patch and 17 percent B patch) was recovered from No. 4 logs (table 10).

Log grade	A to B patch, full sheets	
	1/10-inch	1/8-inch
	Percent	
1	52	85
2	50	65
3	18	31
4	11	19

In the following tabulation, 28 percent of the 1/10-inch random width, 8-foot veneer from No. 1 logs was in veneer grades A to B patch, but only 13 percent was recovered from No. 4 logs.

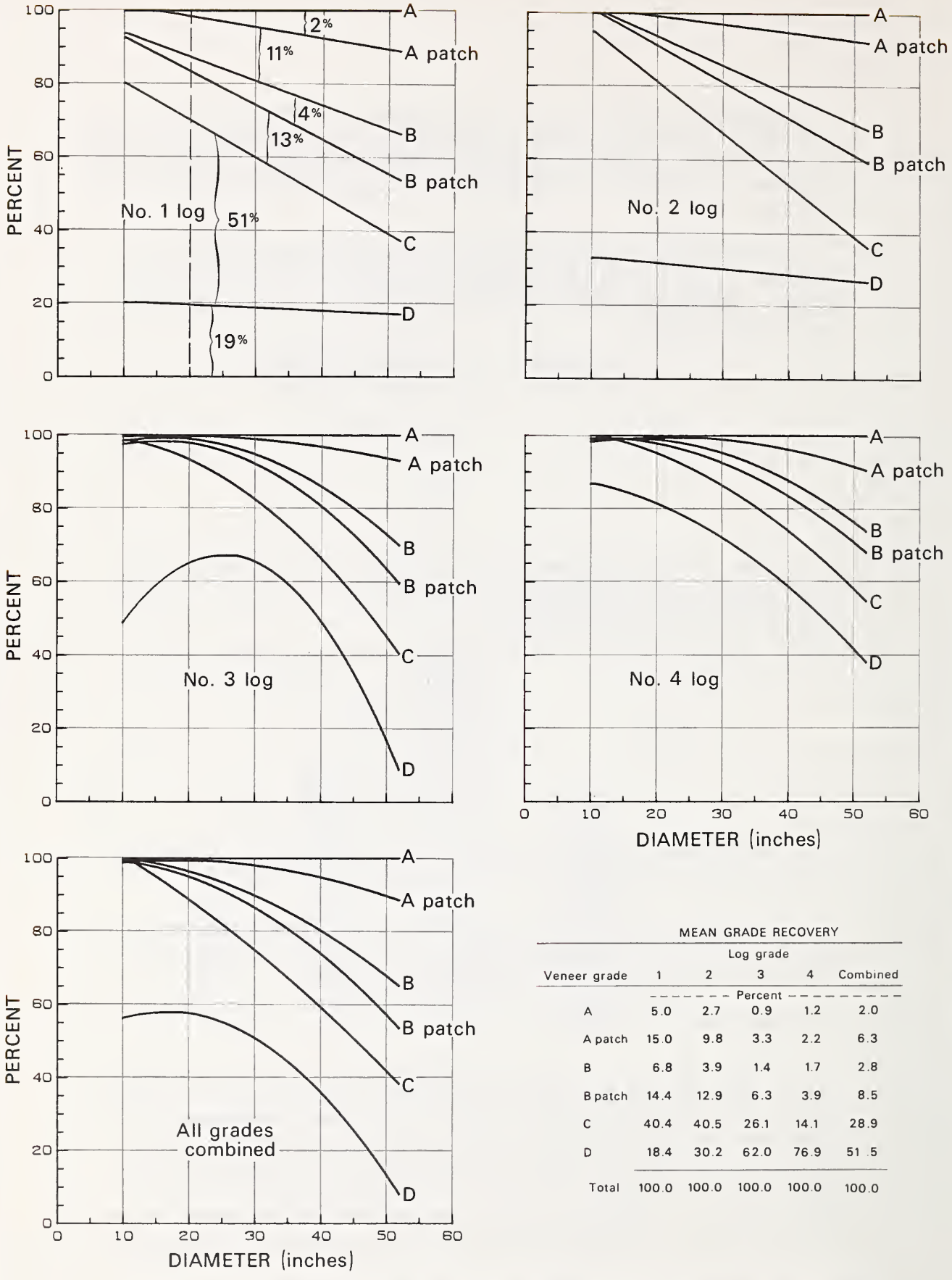
Log grade	A to B patch, random width, 8-foot strips	
	1/10-inch	1/8-inch
	Percent	
1	28	44
2	23	33
3	15	20
4	13	12

The 1/5-inch veneer was clipped entirely into half sheets and produced only grade C and D veneer.

All 1/8-inch core or random width fishtail veneer was graded as C or D veneer. The amount of C veneer in this item was 98 percent for No. 1 logs but only 38 percent for No. 4 logs (appendix tables 7 and 10).

VENEER GRADE RECOVERY

Figure 5 shows the curved recovery data and the mean for each veneer grade. The individual grade curves of estimated veneer recovery percentages are plotted on a cumulative basis. The reader is reminded that when a group of curves is plotted to total 100 percent, any regression line plotted over another regression line is forced to assume somewhat the shape of the lower line. However, the difference between the lines at a diameter class is the value to be noted. The veneer recovery percentages total 100 percent for any diameter class. For example, in figure 5, the 20-inch No. 1 logs recovered



MEAN GRADE RECOVERY

Veneer grade	Log grade 1	2	3	4	Combined
	Percent				
A	5.0	2.7	0.9	1.2	2.0
A patch	15.0	9.8	3.3	2.2	6.3
B	6.8	3.9	1.4	1.7	2.8
B patch	14.4	12.9	6.3	3.9	8.5
C	40.4	40.5	26.1	14.1	28.9
D	18.4	30.2	62.0	76.9	51.5
Total	100.0	100.0	100.0	100.0	100.0

Figure 5.--Veneer grade recovery percentages by log diameter and grade.

2-percent A, 11-percent A patch, 4-percent B, 13-percent B patch, 51-percent C, and 19-percent D. Appendix tables 12 to 16 show actual veneer grade recovery percentages by log scaling diameter for each log grade. The uncurved recovery percentages in table 12 for the 20-inch No. 1 logs are 1.0-percent A, 13.7-percent A patch, 4.1-percent B, 13.3-percent B patch, 60.8-percent C, and 7.1-percent D.

RELATIONSHIP OF NEW GRADES TO PRESENT PEELER-SAWMILL GRADES

The mill operator and timber purchaser usually know veneer yield percentages by the present Peeler-Sawmill log grading system. Appendix tables 17 and 18 are shown to provide a means of comparing where logs graded under the new system rank when graded under present grades. For example, in table 17, 42 percent of the logs under grade No. 1 would be No. 3 Peeler under the present system. Table 18 shows that 54 percent of all No. 3 Peeler logs when regraded were the new No. 1 grade.

The reader at this point may want to refer to page 9, figure 6, of USDA Forest Service Research Paper 151 (*5*) for the curves of dollars per thousand board feet net log scale plotted over scaling diameter. As noted earlier, log size is not a grading specification. These curves of log value over diameter are used to reflect value differences due to log size. Many of the No. 3 Peeler grade logs were so graded because of diameter. However, the new grade specifications show that these logs are No. 1 based on veneer recovery values. Tables of diameter and yield percentages such as tables 12 to 16 reflect the veneer grade recovery difference due to log size.

Under the new grading system some logs also ended up in lower grades. Table 18 shows that only 70 percent of the No. 1 Peeler grade logs qualified for the new No. 1 grade. Logs not qualifying were degraded for such reasons as being adjacent to a cull log or having excessive butt swell, an indication of rot.

REGRESSION EQUATIONS FOR FIGURE 5

The regressions in figure 5 estimate yield percentages by veneer and log grades. These are first and second degree curves of the form:

$$P = a + b_1 D + b_2 D^2$$

where

P = veneer yield percentage
a = curve intercept point of the percentage axis
b = regression coefficient (constant)
D = log scaling diameter.

The regression equations are summarized in appendix table 19.

HOW TO ESTIMATE VENEER GRADE RECOVERY FROM CUBIC VOLUME

A mill manager having a cubic-foot estimate of log or block input volume for veneer can use the figures and tables in this report to easily estimate:

Total square feet of veneer to be recovered;
Veneer yield by log grades; and
Veneer grade recovery for a mix of log grades and diameter classes.

The following example develops steps to make these estimates. The first information developed in this example is a total cubic-foot input volume estimate. It is assumed that a mill manager could obtain this type of information--from bucking records at the pond saw or a tally of log or block diameters made at the veneer lathe. Steps 1, 2, and 3 develop this value for the example.

1. *Identify log grade and size distribution.* A mixture of log grades, lengths, and diameters could be used. However, assume for this example logs averaging 17 feet in scaling length of the following grades and diameters:

25 No. 1 logs,	28-inch diameter	= 15,250 bd. ft.[3/]
50 No. 2 logs,	24-inch diameter	= 21,000 bd. ft.
100 No. 3 logs,	18-inch diameter	= 22,000 bd. ft.
75 No. 4 logs,	22-inch diameter	= 26,250 bd. ft.
Total gross scale, Scribner rule		= 84,500 bd. ft.

2. *Determine cubic volumes by log size(s) and grades.* Calculate the average cubic feet per log for the diameter of logs in each grade. From tables 1 through 4, the following values are read:

8 No. 1 logs,	28-inch diameter,	yield 642.12 cu. ft.	or 80.26 cu. ft. per log
20 No. 2 logs,	24-inch diameter,	yield 1,211.67 cu. ft.	or 60.58 cu. ft. per log
31 No. 3 logs,	18-inch diameter,	yield 1,102.11 cu. ft.	or 35.55 cu. ft. per log
14 No. 4 logs,	22-inch diameter,	yield 796.03 cu. ft.	or 56.86 cu. ft. per log.

The total cubic-foot volume for the example is now determined by multiplying the cubic feet per log by the number of logs in each grade:

25 logs	x 80.26 cu. ft.	= 2,006.5 cu. ft.
50 logs	x 60.58 cu. ft.	= 3,029.0 cu. ft.
100 logs	x 35.55 cu. ft.	= 3,555.0 cu. ft.
75 logs	x 56.86 cu. ft.	= 4,264.5 cu. ft.
Total volume		= 12,855.0 cu. ft.

A mill manager is expected to have this volume of 12,855 cubic feet of log input available to him.

[3/] Gross scale based on U. S. Forest Service R-6 Supplement to National Forest Log Scaling Handbook for West-Side Log Scaling. April 1969. (A 17-foot, 28-inch log has a gross scale of 610 board feet. 25 x 610 = 15,250 board feet.)

3. *The next set of calculations lead to an estimate of the square feet of veneer, 3/8-inch basis, that the cubic-input volume will yield.* The following values are read as accurately as possible from figure 3 by log grade and diameter (they could have been calculated by the equations for the curves in figure 3):

28-inch No. 1 logs average 20.0 square feet of veneer per cubic foot of block volume; and
24-inch No. 2 logs average 19.2;
18-inch No. 3 logs average 16.1;
22-inch No. 4 logs average 11.6.

4. *Expand these square feet per cubic foot by the number of cubic feet estimated for each log grade:*

20.0 x 2006.5 = 40,130 square feet in No. 1 logs
19.2 x 3029.0 = 58,157 square feet in No. 2 logs
16.1 x 3555.0 = 57,236 square feet in No. 3 logs
11.6 x 4264.5 = 49,468 square feet in No. 4 logs
Estimated yield = 204,991 square feet of veneer, 3/8-inch basis.

5. *Determine estimates of veneer grade yields.* The information developed from recovery studies that is probably of greatest interest to the mill manager is percentage yield of product grades. Therefore, the next logical step in this example is to further break down the square-foot recovery estimate into yields by veneer grades.

The following yields are read from the curves in figure 5 for the diameters in the example. These are taken to the nearest whole percentage but also could have been calculated from the equations in table 19.

Veneer grade	Log grade 1	2	3	4
	Percent			
A	4	2	0	1
A patch	14	7	1	1
B	6	4	1	1
B patch	14	11	3	3
C	43	45	32	14
D	19	31	63	80
Total	100	100	100	100

6. *Apply the veneer grade percentages in each log grade, from step 5, to the total square feet for the log grade, from step 4.* This results in the following volumes and gives the operator an estimate of veneer grade recovery from a log grade diameter-cubic volume input. The calculation for grade A veneer from log grade No. 1 is, 4 percent x 40,130 square feet = 1,605.

Veneer grade	Log grade 1	2	3	4	Total
	Square feet, 3/8-inch basis				
A	1,605	1,163	0	495	3,263
A patch	5,618	4,071	572	495	10,756
B	2,408	2,326	572	495	5,801
B patch	5,618	6,397	1,717	1,484	15,216
C	17,256	26,171	18,316	6,925	68,668
D	7,625	18,029	36,059	39,574	101,287
Total	40,130	58,157	57,236	49,468	204,991

The assumption in this example was that the amount and range in defect for the logs included in these studies are typical of the defect a mill would experience. Also, volumes are based on two-block or 17-foot logs.

LITERATURE CITED

1. Bruce, David
   1970. Predicting product recovery from logs and trees. USDA For. Serv. Res. Pap. PNW-107, 15 p., illus. Pac. Northwest For. & Range Exp. Stn., Portland, Oreg.

2. Hunt, Douglas L., and Richard O. Woodfin, Jr.
   1970. Estimate of dry veneer volume losses in Douglas-fir plywood manufacture. USDA For. Serv. Res. Note PNW-134, 10 p., illus. Pac. Northwest For. & Range Exp. Stn., Portland, Oreg.

3. Lane, P. H., R. O. Woodfin, Jr., J. W. Henley, and M. E. Plank
   1973. 1973 Timber cruising grades for Coast Douglas-fir. USDA For. Serv. Pac. Northwest For. & Range Exp. Stn., 2 p. Portland, Oreg.

4. Lane, Paul H., John W. Henley, Richard O. Woodfin, Jr., and Marlin E. Plank
   1973. Lumber recovery from old-growth Coast Douglas-fir. USDA For. Serv. Res. Pap. PNW-154, 44 p., illus. Pac. Northwest For. & Range Exp. Stn., Portland, Oreg.

5. _____, Richard O. Woodfin, Jr., John W. Henley, and Marlin E. Plank
   1973. New timber cruising grades for coast Douglas-fir. USDA For. Serv. Res. Pap. PNW-151, 12 p., illus. Pac. Northwest For. & Range Exp. Stn., Portland, Oreg.

6. _____, Richard O. Woodfin, Jr., John W. Henley, and Marlin E. Plank
   1973. Veneer recovery from old-growth Coast Douglas-fir. USDA For. Serv. Res. Pap. PNW-162, 44 p., illus. Pac. Northwest For. & Range Exp. Stn., Portland, Oreg.

7. Woodfin, Richard O., Jr.
   1973. Wood losses in plywood production--four species. For. Prod. J. 23(9): 98-106.

APPENDIX

Tables 2-6. Log scale, veneer recovery, and cubic volumes by log grades.

Tables 7-11. Distribution of veneer grade and item by thickness for each log grade.

Tables 12-16. Veneer grade recovery by scaling diameter for each log grade.

Tables 17-18. Distribution of logs by present and new grading systems.

Table 19. Summary of regressions.

A summary of specifications for the new timber cruising grades for Coast Douglas-fir.

Table 2.—Coast Douglas-fir log scale, veneer recovery, and cubic volumes by scaling diameter, log grade No. 1

Log scaling diameter (inches)	Number of logs	Scale		Veneer recovery		Cubic volume					
		Gross	Net	Volume	Recovery ratio	Log	Veneer	Veneer recovery	Below grade veneer	Core	Residue
		Board feet		*Square feet*		*Cubic feet*		*Percent*	*Cubic feet*		
12	1	80	80	266	3.32	15.69	8.03	51.2	.18	4.44	3.04
13	3	300	300	746	2.49	52.45	23.13	44.1	.72	15.42	13.18
14	6	720	680	1,726	2.54	128.19	53.52	41.8	.63	32.42	41.62
15	1	150	150	381	2.54	23.24	12.34	53.1	.15	7.00	3.75
16	5	850	830	2,285	2.75	131.52	69.91	53.2	.24	25.23	36.14
17	3	570	520	1,428	2.75	91.58	44.85	49.0	1.27	25.27	20.19
18	5	1,100	1,100	3,522	3.20	175.43	108.45	61.8	1.10	27.07	38.81
19	5	1,250	1,250	3,871	3.10	196.66	118.12	60.1	.65	23.47	54.42
20	5	1,460	1,440	3,994	2.77	206.14	122.40	59.4	2.51	29.59	51.64
21	9	2,880	2,790	8,257	2.96	416.30	250.22	60.1	2.83	49.12	114.13
22	7	2,450	2,440	7,371	3.02	371.43	220.12	59.3	3.69	37.06	110.56
23	9	3,600	3,400	10,478	3.08	526.77	319.32	60.6	3.60	46.88	156.97
24	3	1,290	1,220	3,594	2.95	194.58	110.09	56.6	1.88	17.84	64.77
25	11	5,390	5,120	14,524	2.84	738.55	441.69	59.8	9.45	71.75	215.66
26	7	3,710	3,460	9,857	2.85	500.88	303.36	60.6	4.62	56.30	136.60
27	5	2,900	2,840	8,215	2.89	399.15	248.87	62.3	.20	27.48	122.60
28	8	4,960	4,820	13,914	2.89	642.12	426.10	66.4	7.09	42.12	166.81
29	3	1,920	1,900	5,276	2.78	253.60	159.89	63.0	0	17.89	75.82
30	5	3,500	2,890	8,325	2.88	458.08	251.19	54.8	8.98	34.99	162.92
31	8	6,380	5,600	14,804	2.64	835.54	454.07	54.3	1.49	69.34	310.64
32	8	6,240	5,450	16,250	2.98	811.93	504.05	62.1	10.57	58.02	239.29
33	6	4,980	4,200	12,903	3.07	663.27	387.80	58.5	4.84	43.16	227.47
34	8	6,800	6,350	18,924	2.98	968.39	584.37	60.3	7.85	72.10	304.07
35	10	9,300	8,060	25,154	3.12	1,256.81	771.27	61.4	20.43	80.24	384.87
36	12	11,760	10,200	31,825	3.12	1,662.54	971.94	58.5	21.55	145.86	523.19
37	5	5,450	5,030	14,957	2.97	690.06	459.50	66.6	3.90	33.78	192.88
38	5	5,650	5,320	16,438	3.09	750.48	496.29	66.1	6.04	35.78	212.37
39	4	4,760	4,320	12,796	2.96	615.54	388.05	63.0	0	47.86	179.63
40	7	9,610	8,030	23,593	2.94	1,268.39	717.47	56.6	2.03	128.98	419.91
41	4	5,400	4,350	13,366	3.07	716.60	405.16	56.5	1.43	64.08	245.93
42	5	7,150	6,060	17,230	2.84	912.55	524.20	57.4	3.39	61.99	322.97
43	1	1,480	820	2,175	2.65	179.28	66.57	37.1	.05	8.77	103.89
44	4	6,280	4,860	14,988	3.08	817.01	463.29	56.7	1.07	41.26	311.39
45	0	--	--	--	--	--	--	--	--	--	--
46	3	5,070	4,100	10,765	2.63	641.56	327.43	51.0	2.87	41.44	269.82
47	3	5,280	4,190	14,303	3.41	681.12	450.48	66.1	11.36	28.56	190.72
48	4	7,360	6,810	20,377	2.99	1,001.81	629.30	62.8	17.38	49.37	305.76
49	3	5,730	5,130	12,184	2.38	742.76	383.88	51.7	5.90	41.66	311.32
50	3	5,970	5,190	14,611	2.82	798.56	447.60	56.1	14.85	57.17	278.94
51	2	4,140	3,540	8,787	2.48	566.38	260.93	46.1	10.82	63.39	231.24
52	0	--	--	--	--	--	--	--	--	--	--
53	1	2,230	1,360	4,034	2.97	332.39	122.19	36.8	0	32.58	177.62
Total or average	207	166,100	146,200	428,494	2.93	22,435.33	13,107.44	58.4	197.61	1,796.73	7,333.55

Table 3.—Coast Douglas-fir log scale, veneer recovery, and cubic volumes by scaling diameter, log grade No. 2

Log scaling diameter (inches)	Number of logs	Scale		Veneer recovery		Cubic volume					
		Gross	Net	Volume	Recovery ratio	Log	Veneer	Veneer recovery	Below grade veneer	Core	Residue
		Board feet		*Square feet*		*Cubic feet*		*Percent*	*Cubic feet*		
11	3	240	220	499	2.27	47.37	15.56	32.8	1.14	22.37	8.30
12	8	710	670	1,717	2.56	134.73	52.06	38.6	1.48	43.23	37.96
13	6	660	660	1,439	2.18	116.70	44.87	38.4	2.45	40.91	28.47
14	6	720	670	2,552	3.81	134.82	77.83	57.7	1.85	33.31	21.83
15	10	1,500	1,480	3,961	2.68	240.80	122.22	50.8	1.60	58.54	58.44
16	12	2,040	1,940	5,559	2.87	327.59	170.94	52.2	8.30	68.04	80.31
17	8	1,570	1,570	4,090	2.61	241.35	124.56	51.6	5.38	45.37	66.04
18	19	4,250	3,920	11,377	2.90	694.72	344.21	49.5	4.32	114.81	231.38
19	9	2,250	2,240	6,070	2.71	342.87	180.83	52.7	12.06	53.13	96.85
20	20	5,890	5,560	15,713	2.83	863.25	479.40	55.5	16.78	111.54	255.53
21	15	4,800	4,790	14,232	2.97	694.72	434.55	62.6	13.37	84.10	162.70
22	17	5,950	5,820	17,466	3.00	877.60	541.01	61.6	7.09	107.98	221.52
23	14	5,600	5,400	14,612	2.71	764.09	450.99	59.0	8.20	91.41	213.49
24	20	8,600	8,310	23,405	2.82	1,211.67	729.69	60.2	7.79	108.03	366.16
25	13	6,370	6,050	17,138	2.83	846.17	520.26	61.5	14.75	77.29	233.87
26	13	7,170	6,160	16,904	2.74	983.42	547.05	55.6	16.83	117.61	301.93
27	8	4,640	4,410	13,098	2.97	633.42	409.46	64.6	6.42	47.56	169.98
28	15	9,300	8,250	22,145	2.68	1,268.77	681.09	53.7	22.01	163.59	402.08
29	12	7,680	7,210	20,630	2.86	1,088.67	639.28	58.7	23.05	81.27	345.07
30	12	8,400	7,980	21,368	2.68	1,134.40	665.00	58.6	21.61	96.57	351.22
31	8	6,000	5,570	16,276	2.92	814.14	510.24	62.7	6.06	68.40	229.44
32	13	10,140	9,020	26,333	2.92	1,411.88	816.33	57.8	15.78	98.54	481.23
33	15	12,450	11,460	31,468	2.75	1,661.41	957.67	57.6	35.91	165.52	502.31
34	13	11,050	9,680	28,665	2.96	1,562.25	877.62	56.2	19.85	117.80	546.98
35	9	8,370	7,640	23,096	3.02	1,123.57	700.12	62.3	22.39	79.37	321.69
36	8	7,840	7,040	23,357	3.32	1,057.60	700.70	66.3	31.95	46.09	278.86
37	8	8,720	7,570	23,100	3.05	1,178.14	718.33	61.0	15.36	55.59	388.86
38	9	10,170	8,330	23,443	2.81	1,418.94	717.28	50.6	23.94	73.80	603.92
39	3	3,570	3,240	8,937	2.76	471.19	278.50	59.1	18.42	25.29	148.98
40	6	7,680	6,610	17,505	2.65	1,003.11	546.12	54.4	18.33	56.47	382.19
41	8	10,800	9,580	28,344	2.96	1,443.82	879.22	60.9	19.99	84.57	460.04
42	7	10,010	8,140	24,396	3.00	1,348.18	770.33	57.1	21.14	71.07	485.64
43	5	7,400	6,050	15,371	2.54	913.25	473.09	51.8	8.48	120.26	311.42
44	5	7,850	6,620	21,114	3.19	992.73	655.90	66.1	7.64	58.28	270.91
45	4	6,440	5,260	15,271	2.90	817.23	488.59	59.8	46.80	37.45	244.39
46	1	1,690	1,620	4,652	2.87	252.62	141.11	55.9	4.26	17.64	89.61
47	4	7,040	5,540	15,762	2.85	884.38	472.49	53.4	86.80	63.14	261.95
48	2	3,680	2,430	9,664	3.98	478.13	304.86	63.8	1.53	27.50	144.24
49	2	3,820	3,500	10,241	2.93	504.44	315.18	62.5	11.00	23.81	154.45
50	0	--	--	--	--	--	--	--	--	--	--
51	1	2,070	1,580	5,273	3.34	308.33	173.05	56.1	4.73	14.05	116.50
Total or average	371	235,130	209,790	606,243	2.89	32,292.47	18,727.59	58.0	616.84	2,871.30	10,076.74

Table 4.—Coast Douglas-fir log scale, veneer recovery, and cubic volumes by scaling diameter, log grade No. 3

Log scaling diameter (inches)	Number of logs	Scale		Veneer recovery		Cubic volume					
		Gross	Net	Volume	Recovery ratio	Log	Veneer	Veneer recovery	Below grade veneer	Core	Residue
		Board feet		*Square feet*		*Cubic feet*		*Percent*		*Cubic feet*	
10	1	100	100	291	2.91	20.14	8.83	43.8	0.06	5.50	5.75
11	5	350	350	756	2.16	66.13	22.95	34.7	.78	20.85	21.55
12	12	940	900	2,304	2.56	203.01	70.91	34.9	8.08	64.66	59.36
13	18	2,080	1,900	4,844	2.55	395.17	147.65	37.4	19.96	126.26	101.30
14	21	3,060	2,920	7,236	2.48	526.95	222.73	42.3	13.36	134.99	155.87
15	31	5,370	5,310	13,077	2.46	886.14	402.60	45.4	21.76	201.03	260.75
16	35	6,340	6,250	16,040	2.57	1,037.63	497.45	47.9	30.85	211.84	297.49
17	27	6,010	5,890	16,720	2.84	993.39	517.51	52.1	39.57	175.92	260.39
18	31	7,120	6,850	17,857	2.61	1,102.11	553.97	50.3	31.30	176.16	340.68
19	27	6,500	6,400	18,111	2.83	1,019.35	561.95	55.1	35.03	150.07	272.30
20	19	5,570	5,440	14,033	2.58	822.42	438.60	53.3	18.85	116.16	248.81
21	30	9,910	9,390	23,653	2.52	1,445.04	732.00	50.7	74.66	199.74	438.64
22	22	7,540	7,420	21,197	2.86	1,131.12	662.37	58.6	68.45	120.16	280.14
23	19	7,810	7,710	19,736	2.56	1,077.71	611.86	56.8	45.17	139.63	281.05
24	30	13,180	12,090	33,317	2.76	1,863.72	1,036.52	55.6	79.13	186.77	561.30
25	27	14,100	13,490	35,994	2.67	1,874.66	1,098.84	58.6	129.22	164.14	482.46
26	25	13,190	12,100	30,306	2.50	1,779.71	946.87	53.2	170.33	147.84	514.67
27	17	9,860	9,570	24,778	2.59	1,310.36	769.21	58.7	52.93	104.92	383.30
28	21	13,330	11,990	33,245	2.77	1,750.96	1,028.59	58.7	83.92	137.35	501.10
29	19	12,270	11,600	30,803	2.66	1,647.27	944.14	57.3	112.91	113.39	476.83
30	19	13,300	11,860	32,119	2.71	1,746.74	990.87	56.7	111.96	113.98	529.93
31	16	12,000	10,380	27,265	2.63	1,578.42	835.46	52.9	127.17	139.86	475.93
32	15	12,070	10,620	29,768	2.80	1,622.95	924.51	57.0	122.25	129.75	446.44
33	11	9,130	8,640	24,176	2.80	1,222.48	756.49	61.9	65.95	75.85	324.19
34	6	5,100	4,390	12,316	2.81	707.43	381.06	53.9	2.51	46.45	277.41
35	7	6,510	5,910	16,695	2.82	838.94	519.21	61.9	61.67	60.23	197.83
36	5	5,480	4,600	13,320	2.90	740.63	410.29	55.4	31.73	50.57	248.04
37	13	13,590	11,030	30,324	2.75	1,787.42	940.45	52.6	155.47	116.17	575.33
38	3	3,390	3,020	6,037	2.00	424.14	194.34	45.8	80.48	20.35	128.97
39	7	8,330	6,570	19,150	2.91	1,106.79	595.53	53.8	121.66	51.51	338.09
40	9	12,230	10,700	27,674	2.59	1,549.73	865.88	55.9	131.47	82.16	470.22
41	2	2,700	2,030	5,989	2.95	340.07	181.15	53.3	67.70	10.85	80.37
42	3	4,290	3,660	8,299	2.27	515.26	256.62	49.8	29.00	56.06	173.58
43	2	2,960	2,170	5,877	2.71	379.44	185.76	49.0	34.81	28.53	130.34
44	4	6,280	5,430	13,290	2.45	817.90	396.58	48.5	136.04	44.02	241.26
45	2	3,220	3,010	6,258	2.08	401.38	204.19	50.9	42.12	24.63	130.44
46	0	--	--	--	--	--	--	--	--	--	--
47	0	--	--	--	--	--	--	--	--	--	--
48	1	1,840	1,650	3,065	1.86	231.99	92.87	40.0	2.79	32.68	103.65
49	0	--	--	--	--	--	--	--	--	--	--
50	0	--	--	--	--	--	--	--	--	--	--
51	0	--	--	--	--	--	--	--	--	--	--
52	0	--	--	--	--	--	--	--	--	--	--
53	1	2,230	900	3,690	4.10	295.57	111.76	37.8	15.16	7.90	160.75
Total or average	563	269,280	244,240	649,610	2.66	37,260.27	20,118.57	54.0	2,376.26	3,788.93	10,976.51

Table 5.—Coast Douglas-fir log scale, veneer recovery, and cubic volumes by scaling diameter, log grade No. 4

Log scaling diameter (inches)	Number of logs	Scale		Veneer recovery		Cubic volume					
		Gross	Net	Volume	Recovery ratio	Log	Veneer	Veneer recovery	Below grade veneer	Core	Residue
		Board feet		*Square feet*		*Cubic feet*		*Percent*	*Cubic feet*		
9	1	40	40	217	5.42	20.98	6.45	30.7	0	7.16	7.37
10	0	--	--	--	--	--	--	--	--	--	--
11	1	120	120	380	3.17	31.08	11.62	37.4	1.46	5.72	12.28
12	6	930	830	2,178	2.62	206.80	66.86	32.3	17.52	50.12	72.30
13	11	1,220	1,060	2,550	2.41	263.01	77.95	29.6	20.27	69.35	95.44
14	12	1,820	1,590	3,631	2.28	365.42	112.01	30.7	34.32	105.15	113.94
15	19	3,540	3,160	7,368	2.33	649.14	226.57	34.9	27.99	144.10	250.48
16	17	3,190	2,790	6,529	2.34	574.33	201.28	35.0	80.20	108.37	184.48
17	13	2,920	2,730	5,764	2.11	476.29	174.65	36.7	34.50	78.75	188.39
18	15	3,990	3,560	7,687	2.16	652.46	239.61	36.7	34.31	93.18	285.36
19	18	5,160	4,790	8,836	1.84	819.95	272.50	33.2	99.54	138.91	309.00
20	23	7,070	6,420	14,845	2.31	1,076.48	458.15	42.6	134.48	142.73	341.12
21	21	7,120	6,580	15,096	2.29	1,063.51	467.14	43.9	76.85	121.01	398.51
22	14	5,280	4,710	11,599	2.46	796.03	360.52	45.3	47.49	83.91	304.11
23	18	7,380	6,450	11,692	1.81	1,035.91	360.49	34.8	124.96	126.37	424.09
24	14	6,950	6,440	11,278	1.75	1,018.92	349.06	34.3	212.55	96.77	360.54
25	17	8,870	8,170	18,021	2.21	1,232.01	572.17	46.4	131.39	103.16	425.29
26	12	6,660	5,890	11,343	1.93	927.22	349.63	37.7	114.32	110.07	353.20
27	16	9,640	7,950	15,119	1.90	1,310.20	475.39	36.3	151.82	144.41	538.58
28	12	7,840	7,130	13,592	1.91	1,063.85	421.07	39.6	173.89	87.20	381.69
29	6	3,880	3,060	6,916	2.26	525.03	210.54	40.1	76.23	53.46	184.80
30	12	8,400	7,430	15,098	2.03	1,118.33	467.27	41.8	108.50	77.75	464.81
31	9	7,180	6,410	11,800	1.84	980.97	372.92	38.0	155.01	59.98	393.06
32	8	6,240	4,910	9,423	1.92	847.81	291.21	34.3	186.59	85.12	284.89
33	9	7,440	6,570	11,095	1.69	1,003.34	341.15	34.0	161.49	92.47	408.23
34	6	5,100	4,740	10,535	2.22	720.90	332.24	46.1	122.22	41.61	224.83
35	5	4,650	3,710	7,739	2.09	631.08	243.41	38.6	68.00	40.49	279.18
36	3	3,340	2,760	3,812	1.38	447.76	120.52	26.9	95.39	65.58	166.27
37	6	6,540	5,990	12,402	2.07	852.38	387.46	45.5	115.96	68.49	280.47
38	2	2,260	1,950	2,285	1.17	290.39	70.76	24.4	111.15	42.61	65.87
39	3	4,250	3,470	8,503	2.45	560.03	263.76	47.1	40.82	28.35	227.10
40	2	2,560	2,080	2,398	1.15	328.95	78.47	23.9	119.89	18.69	111.90
41	1	1,350	1,270	1,928	1.52	168.65	56.57	33.5	59.52	5.72	46.84
42	3	4,290	3,720	8,339	2.24	527.76	267.46	50.7	38.70	40.16	181.44
43	2	2,960	2,360	2,035	.86	372.64	66.15	17.8	176.51	19.96	110.02
44	0	--	--	--	--	--	--	--	--	--	--
45	2	4,210	2,180	3,996	1.83	526.25	120.96	23.0	8.96	92.36	303.97
46	1	1,690	760	3,034	3.99	209.19	98.58	47.1	29.04	9.05	72.52
47	1	1,760	1,410	2,367	1.68	220.40	76.96	34.9	82.09	7.73	53.62
48	0	--	--	--	--	--	--	--	--	--	--
49	0	--	--	--	--	--	--	--	--	--	--
50	0	--	--	--	--	--	--	--	--	--	--
51	0	--	--	--	--	--	--	--	--	--	--
52	1	2,150	1,060	2,258	2.13	266.65	73.34	27.5	94.36	7.57	91.38
53	0	--	--	--	--	--	--	--	--	--	--
54	0	--	--	--	--	--	--	--	--	--	--
55	1	2,410	1,200	3,464	2.89	316.31	112.55	35.6	48.45	9.25	146.06
Total or average	343	172,400	147,450	297,152	2.02	24,498.41	9,255.40	37.8	3,416.74	2,682.84	9,143.43

Table 6.—Coast Douglas-fir log scale, veneer recovery, and cubic volumes by scaling diameter, all log grades

Log scaling diameter (inches)	Number of logs	Scale		Veneer recovery		Cubic volume					
		Gross	Net	Volume	Recovery ratio	Log	Veneer	Veneer recovery	Below grade veneer	Core	Residue
		Board feet		*Square feet*		*Cubic feet*		*Percent*	*Cubic feet*		
9	1	40	40	217	5.42	20.98	6.45	30.7	0	7.16	7.37
10	1	100	100	291	2.91	20.14	8.83	43.8	.06	5.50	5.75
11	9	710	690	1,635	2.37	144.58	50.13	34.7	3.38	48.94	42.13
12	27	2,660	2,480	6,465	2.61	560.23	197.86	35.3	27.26	162.45	172.66
13	38	4,260	3,920	9,579	2.44	827.33	293.60	35.5	43.40	251.94	238.39
14	45	6,320	5,860	15,145	2.58	1,155.38	466.09	40.3	50.16	305.87	333.26
15	61	10,560	10,100	24,787	2.45	1,799.32	763.73	42.4	51.50	410.67	573.42
16	69	12,420	11,810	30,413	2.58	2,071.07	939.58	45.4	119.59	413.48	598.42
17	51	11,070	10,710	28,002	2.61	1,802.61	861.57	47.8	80.72	325.31	535.01
18	70	16,460	15,430	40,443	2.62	2,624.72	1,246.24	47.5	71.03	411.22	896.23
19	59	15,160	14,680	36,888	2.51	2,378.83	1,133.40	47.6	147.28	365.58	732.57
20	67	19,990	18,860	48,585	2.58	2,968.29	1,498.55	50.5	172.62	400.02	897.10
21	75	24,710	23,550	61,238	2.60	3,619.57	1,883.91	52.0	167.71	453.97	1,113.98
22	60	21,220	20,390	57,633	2.83	3,176.18	1,784.02	56.2	126.72	349.11	916.33
23	60	24,390	22,960	56,518	2.46	3,404.48	1,742.66	51.2	181.93	404.29	1,075.60
24	67	30,020	28,060	71,594	2.55	4,288.89	2,225.36	51.9	301.35	409.41	1,352.77
25	68	34,730	32,830	85,677	2.61	4,691.39	2,632.96	56.1	284.81	416.34	1,357.28
26	57	30,730	27,610	68,410	2.48	4,191.23	2,146.91	51.2	306.10	431.82	1,306.40
27	46	27,040	24,770	61,210	2.47	3,653.13	1,902.93	52.1	211.37	324.37	1,214.46
28	56	35,430	32,190	82,896	2.58	4,725.70	2,556.85	54.1	286.91	430.26	1,451.68
29	40	25,750	23,770	63,625	2.68	3,514.57	1,953.85	55.6	212.19	266.01	1,082.52
30	48	33,600	30,160	76,910	2.55	4,457.55	2,374.33	53.3	251.05	323.29	1,508.88
31	41	31,560	27,960	70,145	2.51	4,209.07	2,172.69	51.6	289.73	337.58	1,409.07
32	44	34,690	30,000	81,774	2.73	4,694.57	2,536.10	54.0	335.19	371.43	1,451.85
33	41	34,000	30,870	79,642	2.58	4,550.50	2,443.11	53.7	268.19	377.00	1,462.20
34	33	28,050	25,160	70,440	2.80	3,958.97	2,175.29	54.9	152.43	277.96	1,353.29
35	31	28,830	25,320	72,684	2.87	3,850.40	2,234.01	58.0	172.49	260.33	1,183.57
36	28	28,420	24,600	72,314	2.94	3,908.53	2,203.45	56.4	180.62	308.10	1,216.36
37	32	34,300	29,620	80,783	2.73	4,508.00	2,505.74	55.6	290.69	274.03	1,437.54
38	19	21,470	18,620	48,203	2.59	2,883.95	1,478.67	51.3	221.61	172.54	1,011.13
39	17	20,910	17,600	49,386	2.81	2,753.55	1,525.84	55.4	180.90	153.01	893.80
40	24	32,080	27,420	71,170	2.60	4,150.18	2,207.94	53.2	271.72	286.30	1,384.22
41	15	20,250	17,230	49,627	2.88	2,669.14	1,522.10	57.0	148.64	165.22	833.18
42	18	25,740	21,580	58,264	2.70	3,303.75	1,818.61	55.0	92.23	229.28	1,163.63
43	10	14,800	11,400	25,458	2.23	1,844.61	791.57	42.9	219.85	177.52	655.67
44	13	20,410	16,910	49,392	2.92	2,627.64	1,515.77	57.7	144.75	143.56	823.56
45	8	13,870	10,450	25,525	2.44	1,744.86	813.74	46.6	97.88	154.44	678.80
46	5	8,450	6,480	18,451	2.85	1,103.37	567.12	51.4	36.17	68.13	431.95
47	8	14,080	11,140	32,432	2.91	1,785.90	999.93	56.0	180.25	99.43	506.29
48	7	12,880	10,890	33,106	3.04	1,711.93	1,027.03	60.0	21.70	109.55	553.65
49	5	9,550	8,630	22,425	2.60	1,247.20	699.06	56.1	16.90	65.47	465.77
50	3	5,970	5,190	14,611	2.82	798.56	447.60	45.7	14.85	57.17	278.94
51	3	6,210	5,120	14,060	2.75	874.71	433.98	49.6	15.55	77.44	347.74
52	1	2,150	1,060	2,258	2.13	266.65	73.34	27.5	94.36	7.57	91.38
53	2	4,460	2,260	7,724	3.42	627.96	233.95	37.3	15.16	40.48	338.37
54	0	--	--	--	--	--	--	--	--	--	--
55	1	2,410	1,200	3,464	2.89	316.31	112.55	35.6	48.45	9.25	146.06
Total or average	1,484	842,910	747,680	1,981,499	2.65	116,486.48	61,209.00	52.5	6,607.45	11,139.80	37,530.23

Table 7.—Distribution of veneer grade and item by thickness, log grade No. 1—Coast Douglas-fir

Veneer item	Veneer grade						Percent of total volume	Total veneer volume	Below grade veneer volume
	A	A patch	B	B patch	C	D			
	Percent							*Square feet, 3/8-inch basis*	
Full sheets:									
1/10-inch	8	26	8	20	25	13	43.6	186,805	482
1/8-inch	15	15	23	32	12	3	1.6	6,958	0
1/5-inch	--	--	--	--	--	--	--	0	0
Half sheets:									
1/10-inch	7	18	6	14	34	21	20.7	88,690	1,708
1/8-inch	23	13	20	24	19	1	.9	3,870	53
1/5-inch	0	0	0	0	100	0	.1	440	0
Random width, 8-foot:									
1/10-inch	5	7	7	9	47	25	26.0	111,470	3,839
1/8-inch	14	7	13	10	51	5	1.4	5,828	7
1/5-inch	--	--	--	--	--	--	--	0	0
Random width fishtail:[1/]									
1/10-inch	1	(2/)	22	(2/)	57	20	5.4	23,129	416
1/8-inch	0	0	0	0	98	2	.3	1,304	0
1/5-inch	--	--	--	--	--	--	--	0	0
Total							100.0	428,494	6,505

[1/] Includes all random width veneer less than 8 feet long.

[2/] Less than 0.5 percent.

Table 8.—Distribution of veneer grade and item by thickness, log grade No. 2—Coast Douglas-fir

Veneer item	Veneer grade						Percent of total volume	Total veneer volume	Below grade veneer volume
	A	A patch	B	B patch	C	D			
	Percent							*Square feet, 3/8-inch basis*	
Full sheets:									
1/10-inch	5	21	4	20	23	27	41.0	248,318	2,381
1/8-inch	8	15	7	35	23	12	4.1	24,813	11
1/5-inch	--	--	--	--	--	--	--	0	0
Half sheets:									
1/10-inch	4	12	3	14	30	37	22.2	134,511	6,787
1/8-inch	12	13	10	33	23	9	2.0	12,182	106
1/5-inch	--	--	--	--	89	11	1.2	7,087	31
Random width, 8-foot:									
1/10-inch	3	6	5	9	42	35	20.4	123,837	9,840
1/8-inch	9	3	9	12	51	16	3.3	20,117	62
1/5-inch	--	--	--	--	--	--	--	0	0
Random width fishtail:[1/]									
1/10-inch	(2/)	1	15	(2/)	59	25	5.2	31,488	920
1/8-inch	0	0	0	0	91	9	.6	3,890	0
1/5-inch	--	--	--	--	--	--	--	0	0
Total							100.0	606,243	20,138

[1/] Includes all random width veneer less than 8 feet long.

[2/] Less than 0.5 percent.

Table 9.—Distribution of veneer grade and item by thickness, log grade No. 3—Coast Douglas-fir

Veneer item	Veneer grade						Percent of total volume	Total veneer volume	Below grade veneer volume
	A	A patch	B	B patch	C	D			
	Percent							*Square feet, 3/8-inch basis*	
Full sheets:									
1/10-inch	1	6	1	10	13	69	32.6	212,179	4,296
1/8-inch	0	3	2	26	17	52	5.0	32,463	124
1/5-inch	--	--	--	--	--	--	--	0	0
Half sheets:									
1/10-inch	2	8	1	8	17	64	29.8	193,988	42,246
1/8-inch	4	8	7	23	19	39	2.8	17,982	423
1/5-inch	--	--	--	--	73	27	2.6	17,101	129
Random width, 8-foot:									
1/10-inch	2	4	3	6	29	56	17.3	112,210	26,743
1/8-inch	3	1	5	11	29	51	4.2	27,130	348
1/5-inch	--	--	--	--	--	--	--	0	0
Random width fishtail:[1/]									
1/10-inch	1	1	6	1	47	44	5.0	32,170	3,291
1/8-inch	0	0	0	0	61	39	.7	4,387	0
1/5-inch	--	--	--	--	--	--	--	0	0
Total							100.0	649,610	77,600

[1/] Includes all random width veneer less than 8 feet long.

Table 10.—Distribution of veneer grade and item by thickness, log grade No. 4—Coast Douglas-fir

Veneer item	Veneer grade						Percent of total volume	Total veneer volume	Below grade veneer volume
	A	A patch	B	B patch	C	0			
	Percent							*Square feet, 3/8-inch basis*	
Full sheets:									
1/10-inch	2	4	1	5	4	84	17.6	52,136	2,014
1/8-inch	0	2	0	17	7	74	6.3	18,634	793
1/5-inch	--	--	--	--	--	--	--	0	0
Half sheets:									
1/10-inch	3	7	2	6	7	75	31.7	94,354	65,134
1/8-inch	2	4	2	16	7	69	4.3	12,705	1,289
1/5-inch	--	--	--	--	44	56	2.7	8,064	75
Random width, 8-foot:									
1/10-inch	2	3	3	5	19	68	20.7	61,686	34,207
1/8-inch	2	1	4	5	13	75	6.5	19,252	1,019
1/5-inch	--	--	--	--	--	--	--	0	0
Random width fishtail:[1/]									
1/10-inch	(2/)	(2/)	10	(2/)	38	52	8.8	26,218	5,006
1/8-inch	0	0	0	0	38	62	1.4	4,103	0
1/5-inch	--	--	--	--	--	--	--	0	0
Total							100.0	297,152	109,537

[1/] Includes all random width veneer less than 8 feet long.

[2/] Less than 0.5 percent.

Table 11.—Distribution of veneer grade and item by thickness for all log grades—Coast Douglas-fir

Veneer item	Veneer grade						Percent of total volume	Total veneer volume	Below grade veneer volume
	A	A patch	B	B patch	C	D			
	Percent							*Square feet, 3/8-inch basis*	
Full sheets:									
1/10-inch	4	17	4	16	19	40	35.3	699,438	9,173
1/8-inch	4	7	5	27	16	41	4.2	82,868	928
1/5-inch	--	--	--	--	--	--	--	0	0
Half sheets:									
1/10-inch	4	11	3	10	21	51	25.8	511,543	115,875
1/8-inch	7	9	8	24	17	35	2.4	46,739	1,871
1/5-inch	0	0	0	0	70	30	1.6	32,692	235
Random width, 8-foot:									
1/10-inch	3	5	4	8	37	43	20.7	409,203	74,629
1/8-inch	5	2	6	10	33	44	3.6	72,327	1,436
1/5-inch	--	--	--	--	--	--	--	0	0
Random width fishtail:[1/]									
1/10-inch	(2/)	1	13	(2/)	51	36	5.7	113,005	9,633
1/8-inch	0	0	0	0	66	34	.7	13,684	0
1/5-inch	--	--	--	--	--	--	--	0	0
Total							100.0	1,981,499	213,780

[1/] Includes all random width veneer less than 8 feet long.

[2/] Less than 0.5 percent.

Table 12.—Veneer grade recovery by scaling diameter, log grade No. 1—Coast Douglas-fir

Log scaling diameter (inches)	Number of logs	Veneer volume, 3/8-inch basis	Recovery by veneer grade					
			A	A patch	B	B patch	C	D
		Square feet	*Percent*					
12	1	266	0.8	5.3	9.0	0.8	60.4	23.7
13	3	746	0	3.9	2.0	.7	71.6	21.8
14	6	1,726	1.7	2.0	5.3	5.1	62.5	23.4
15	1	381	0	0	0	5.2	91.1	3.7
16	5	2,285	2.0	7.8	4.6	9.6	54.2	21.8
17	3	1,428	3.6	15.8	1.9	9.7	50.0	19.0
18	5	3,522	2.1	7.4	3.0	18.3	55.7	13.5
19	5	3,871	.6	15.6	3.0	14.4	53.2	13.2
20	5	3,994	1.0	13.7	4.1	13.3	60.8	7.1
21	9	8,257	1.0	16.9	6.9	15.7	41.0	18.5
22	7	7,371	3.9	13.2	8.5	8.0	53.4	13.0
23	9	10,478	1.4	15.8	6.2	20.5	48.2	7.9
24	3	3,594	.6	16.6	2.9	16.5	48.8	14.6
25	11	14,524	3.0	10.9	3.7	18.0	46.2	18.2
26	7	9,857	2.6	20.5	3.4	17.6	37.7	18.2
27	5	8,215	.6	9.2	8.2	18.1	34.5	29.4
28	8	13,914	1.7	16.4	5.4	15.8	38.0	22.7
29	3	5,276	4.5	16.0	3.0	17.6	43.0	15.9
30	5	8,325	8.6	25.5	3.1	11.0	27.5	24.3
31	8	14,804	2.1	6.2	3.9	14.6	34.1	39.1
32	8	16,250	8.3	20.1	5.7	16.0	28.7	21.2
33	6	12,903	5.4	13.3	3.8	15.3	43.6	18.6
34	8	18,924	7.6	20.0	10.5	17.1	26.3	18.5
35	10	25,154	5.6	19.7	3.1	16.3	34.4	20.9
36	12	31,825	8.1	17.8	7.2	12.1	38.3	16.5
37	5	14,957	5.5	21.1	8.5	19.3	29.6	16.0
38	5	16,438	8.9	15.3	2.8	13.4	40.7	18.9
39	4	12,796	3.6	9.7	10.4	24.5	35.7	16.1
40	7	23,593	7.1	23.0	14.4	20.3	19.9	15.3
41	4	13,366	4.8	10.5	6.7	18.9	39.6	19.5
42	5	17,230	1.6	22.5	14.4	17.5	22.6	21.4
43	1	2,175	1.7	23.9	19.1	11.8	39.2	4.3
44	4	14,988	16.2	22.8	13.9	8.7	30.4	8.0
45	0	--	--	--	--	--	--	--
46	3	10,765	19.5	24.4	13.6	5.1	23.8	13.6
47	3	14,303	5.0	24.0	8.4	14.7	18.9	29.0
48	4	20,377	10.7	25.8	13.4	13.4	26.1	10.6
49	3	12,184	11.0	20.9	12.3	12.0	38.1	5.7
50	3	14,611	14.0	16.4	13.1	12.4	34.9	9.2
51	2	8,787	6.3	10.4	13.6	13.4	43.3	13.0
52	0	--	--	--	--	--	--	--
53	1	4,034	30.5	8.1	24.1	7.8	25.6	3.9
Total or average	207	428,494	6.7	17.6	8.3	15.1	34.8	17.5

Table 13.—Veneer grade recovery by scaling diameter, log grade No. 2—Coast Douglas-fir

Log scaling diameter (inches)	Number of logs	Veneer volume, 3/8-inch basis	Recovery by veneer grade					
			A	A patch	B	B patch	C	D
		Square feet	*Percent*					
11	3	499	2.2	9.8	7.4	6.4	50.4	23.8
12	8	1,717	.6	.6	.6	.6	79.6	18.0
13	6	1,439	.3	.6	.9	4.4	64.7	29.1
14	6	2,552	1.0	1.9	2.1	3.8	62.8	28.4
15	10	3,961	.3	1.1	.9	3.4	57.6	36.7
16	12	5,559	.2	1.4	1.5	5.6	56.0	35.3
17	8	4,090	.6	2.2	.8	7.6	54.7	34.1
18	19	11,377	1.0	5.2	3.4	8.6	46.4	35.4
19	9	6,070	1.4	2.5	3.2	6.3	52.9	33.7
20	20	15,713	.5	6.7	1.9	12.7	52.0	26.2
21	15	14,232	.9	5.5	1.7	8.4	49.1	34.4
22	17	17,466	.7	6.1	1.6	11.0	38.5	42.1
23	14	14,612	2.6	8.4	2.6	16.9	40.8	28.7
24	20	23,405	1.1	8.5	1.5	13.0	45.5	30.4
25	13	17,138	1.5	12.3	4.4	16.5	33.4	31.9
26	13	16,904	2.7	7.5	2.7	11.9	36.5	38.7
27	8	13,098	1.6	13.9	2.2	22.3	44.8	15.2
28	15	22,145	2.0	12.9	4.3	13.7	32.7	34.4
29	12	20,630	2.3	10.4	2.7	17.1	40.9	26.6
30	12	21,368	2.6	14.1	5.4	18.2	34.3	25.4
31	8	16,276	3.2	16.8	6.9	16.7	27.0	29.4
32	13	26,333	2.3	13.7	6.3	16.3	32.7	28.7
33	15	31,468	1.9	13.4	2.7	17.5	25.4	39.1
34	13	28,665	5.6	12.0	6.9	13.8	28.7	33.0
35	9	23,096	5.4	16.9	6.4	20.4	21.1	29.8
36	8	23,357	6.0	14.6	2.5	14.8	19.9	42.2
37	8	23,100	2.5	19.8	6.6	19.9	24.5	26.7
38	9	23,443	4.6	10.9	5.5	12.0	48.5	18.5
39	3	8,937	12.6	13.1	4.4	17.4	41.0	11.5
40	6	17,505	1.3	12.0	8.1	9.9	30.3	38.4
41	8	28,344	10.0	20.6	9.7	15.6	25.6	18.5
42	7	24,396	13.0	14.5	5.9	21.6	22.3	22.7
43	5	15,371	4.8	27.0	10.6	19.9	24.6	13.1
44	5	21,114	7.4	31.2	2.7	26.0	15.7	17.0
45	4	15,271	12.6	18.2	8.0	17.3	18.5	20.9
46	1	4,652	5.4	25.7	23.6	18.5	13.4	13.4
47	4	15,762	6.9	12.2	4.0	12.6	14.6	49.7
48	2	9,664	10.2	20.5	12.1	14.8	13.9	28.5
49	2	10,241	2.2	6.5	2.9	24.5	39.1	24.8
50	0	--	--	--	--	--	--	--
51	1	5,273	0	30.8	0	15.0	43.6	10.6
Total or average	371	606,243	4.2	13.6	4.9	15.7	32.5	29.1

Table 14.—Veneer grade recovery by scaling diameter, log grade No. 3—Coast Douglas-fir

Log scaling diameter (inches)	Number of logs	Veneer volume, 3/8-inch basis	Recovery by veneer grade					
			A	A patch	B	B patch	C	D
		Square feet	*Percent*					
10	1	291	0	1.7	0.7	0	75.6	22.0
11	5	756	0	0	.4	0	63.5	36.1
12	12	2,304	.2	.2	.1	.1	42.4	57.0
13	18	4,844	.4	1.3	.8	1.5	43.4	52.6
14	21	7,236	0	.5	.4	.7	47.4	51.0
15	31	13,077	.5	.6	.6	2.4	34.9	61.0
16	35	16,040	.2	1.3	.8	2.7	32.0	63.0
17	27	16,720	.3	1.3	.3	4.5	23.7	69.9
18	31	17,857	.1	.8	.7	3.5	36.6	58.3
19	27	18,111	.2	.6	.4	3.2	32.8	62.8
20	19	14,033	.4	1.2	2.2	6.0	24.3	65.9
21	30	23,653	.7	1.9	.8	4.8	21.6	70.2
22	22	21,197	.6	2.2	1.1	6.0	21.3	68.8
23	19	19,736	1.0	1.6	1.1	6.0	24.5	65.8
24	30	33,317	.6	1.7	.8	6.7	26.8	63.4
25	27	35,994	.6	3.1	1.6	8.5	21.4	64.8
26	25	30,306	.4	2.9	1.0	6.3	18.1	71.3
27	17	24,778	.6	3.7	1.1	6.3	20.1	68.2
28	21	33,245	1.4	3.6	1.6	6.9	21.7	64.8
29	19	30,803	1.5	2.4	1.9	7.5	16.4	70.3
30	19	32,119	.7	3.8	1.9	9.0	15.1	69.5
31	16	27,265	1.2	6.7	1.3	11.8	15.2	63.8
32	15	29,768	1.3	6.0	1.5	15.2	20.6	55.4
33	11	24,176	1.7	5.3	1.0	12.0	12.9	67.1
34	6	12,316	1.6	12.9	5.9	17.2	18.2	44.2
35	7	16,695	1.4	9.8	.9	15.2	15.4	57.3
36	5	13,320	4.9	9.3	4.0	13.7	18.8	49.3
37	13	30,324	3.6	11.9	3.5	16.5	18.7	45.8
38	3	6,037	1.9	5.5	.7	8.3	11.0	72.6
39	7	19,150	5.7	20.5	4.2	16.0	16.4	37.2
40	9	27,674	3.8	10.0	3.2	13.6	18.5	50.9
41	2	5,989	7.5	21.1	1.7	13.1	12.7	43.9
42	3	8,299	3.3	11.8	6.4	15.3	16.5	46.7
43	2	5,877	3.2	14.5	1.6	17.5	17.0	46.2
44	4	13,290	1.5	4.9	9.7	12.8	25.7	45.4
45	2	6,258	2.8	14.1	.6	10.9	20.4	51.2
46	0	--	--	--	--	--	--	--
47	0	--	--	--	--	--	--	--
48	1	3,065	16.4	35.5	12.2	15.4	8.5	12.0
49	0	--	--	--	--	--	--	--
50	0	--	--	--	--	--	--	--
51	0	--	--	--	--	--	--	--
52	0	--	--	--	--	--	--	--
53	1	3,690	2.8	27.2	9.7	16.6	12.4	31.3
Total or average	563	649,610	1.6	5.5	1.9	9.2	21.4	60.4

Table 15.—Veneer grade recovery by scaling diameter, log grade No. 4—Coast Douglas-fir

Log scaling diameter (inches)	Number of logs	Veneer volume, 3/8-inch basis	Recovery by veneer grade					
			A	A patch	B	B patch	C	D
		Square feet	*Percent*					
9	1	217	0	0	0	0	19.8	80.2
10	0	--	--	--	--	--	--	--
11	1	380	0	0	0	0	11.6	38.4
12	6	2,178	3.0	1.3	1.6	2.3	13.0	78.8
13	11	2,550	2.8	.9	0	.5	18.5	77.3
14	12	3,631	.3	.1	.2	.2	8.5	90.7
15	19	7,368	0	.2	.4	2.4	10.5	86.5
16	17	6,529	1.7	.8	.1	1.1	5.7	90.6
17	13	5,764	0	.5	1.8	1.1	21.1	75.5
18	15	7,687	0	0	.4	1.9	18.0	79.7
19	18	8,836	.1	.1	.4	2.2	11.8	85.4
20	23	14,845	.6	.8	.4	1.5	12.3	84.4
21	21	15,096	.1	.1	1.2	1.8	14.1	82.7
22	14	11,599	.1	.5	.6	2.4	18.1	78.3
23	18	11,692	.4	2.3	2.4	4.3	13.6	77.0
24	14	11,278	.9	.6	.3	1.9	9.8	86.5
25	17	18,021	.9	1.0	1.0	4.7	10.7	81.7
26	12	11,343	.5	1.7	1.6	4.1	10.3	81.8
27	16	15,119	2.2	1.8	2.9	8.5	11.5	73.1
28	12	13,592	.7	1.3	1.5	10.8	9.5	76.2
29	6	6,916	.1	.8	.9	2.7	10.6	84.9
30	12	15,098	3.4	5.0	4.6	7.5	15.1	64.4
31	9	11,800	1.1	3.8	3.7	6.6	12.5	72.3
32	8	9,423	2.2	7.1	3.1	9.1	15.3	63.2
33	9	11,095	.9	3.8	5.1	7.0	14.5	68.7
34	6	10,535	3.6	11.2	2.9	9.4	10.0	62.9
35	5	7,739	2.7	5.7	7.4	7.3	18.7	58.2
36	3	3,812	2.3	9.8	8.0	5.0	14.0	60.9
37	6	12,402	5.1	7.8	3.5	8.7	17.2	57.7
38	2	2,285	11.5	9.9	4.1	4.1	19.7	50.7
39	3	8,503	8.7	8.4	8.8	14.6	14.8	44.7
40	2	2,398	0	7.1	0	9.0	19.6	64.3
41	1	1,928	.4	4.7	3.0	23.7	21.2	47.0
42	3	8,339	2.2	9.3	2.7	20.2	21.1	44.5
43	2	2,035	5.4	6.3	1.4	10.0	7.5	69.4
44	0	--	--	--	--	--	--	--
45	2	3,996	4.3	18.1	15.9	8.2	17.3	36.2
46	1	3,034	18.5	8.4	3.7	6.7	10.7	52.0
47	1	2,367	8.7	23.6	2.4	13.6	7.9	43.8
48	0	--	--	--	--	--	--	--
49	0	--	--	--	--	--	--	--
50	0	--	--	--	--	--	--	--
51	0	--	--	--	--	--	--	--
52	1	2,258	10.0	16.3	2.2	8.5	3.7	59.3
53	0	--	--	--	--	--	--	--
54	0	--	--	--	--	--	--	--
55	1	3,464	5.3	7.9	1.7	5.5	15.6	64.0
Total or average	343	297,152	2.1	3.7	2.6	6.1	13.4	72.1

Table 16.—Veneer grade recovery by scaling diameter, all log grades—Coast Douglas-fir

Log scaling diameter (inches)	Number of logs	Veneer volume, 3/8-inch basis	Recovery by veneer grade					
			A	A patch	B	B patch	C	D
		Square feet	*Percent*					
9	1	217	0	0	0	0	19.8	80.2
10	1	291	0	1.7	.7	0	75.6	22.0
11	9	1,635	.7	3.0	2.4	2.0	47.4	44.5
12	27	6,465	1.3	.9	1.1	1.0	43.1	52.6
13	38	9,579	1.0	1.3	.7	1.6	42.2	53.2
14	45	15,145	.4	.8	1.2	1.6	42.4	53.6
15	61	24,787	.3	.6	.6	2.6	32.2	63.7
16	69	30,413	.7	1.7	1.1	3.4	32.4	60.7
17	51	28,002	.5	2.0	.8	4.5	29.0	63.2
18	70	40,443	.5	2.5	1.6	5.9	37.5	52.0
19	59	36,888	.4	2.4	1.1	4.6	33.2	58.3
20	67	48,585	.5	3.9	1.7	7.4	32.6	53.9
21	75	61,238	.7	4.3	1.9	6.4	28.8	57.9
22	60	57,633	.9	4.4	2.1	7.0	30.0	55.6
23	60	56,518	1.4	6.2	2.7	11.2	30.8	47.7
24	67	71,594	.8	4.5	1.0	8.5	31.3	53.9
25	68	85,677	1.2	5.8	2.4	10.9	25.8	53.9
26	57	68,410	1.3	6.4	1.8	9.0	24.2	57.3
27	46	61,210	1.2	6.1	2.7	11.8	25.2	53.0
28	56	82,896	1.5	7.8	2.9	10.8	25.4	51.6
29	40	63,625	1.9	5.9	2.2	10.9	25.9	53.2
30	48	76,910	2.6	9.2	3.6	11.5	21.7	51.4
31	41	70,145	1.8	8.5	3.6	12.6	21.5	52.0
32	44	81,774	3.1	11.4	4.1	15.0	25.5	40.9
33	41	79,642	2.3	9.6	2.7	14.0	23.0	48.4
34	33	70,440	5.1	14.2	7.1	14.6	23.4	35.6
35	31	72,684	4.3	15.0	4.1	16.4	24.1	36.1
36	28	72,314	6.6	14.8	5.1	12.9	27.5	33.1
37	32	80,783	3.9	15.2	5.3	16.8	22.1	36.7
38	19	48,203	6.1	11.7	3.9	11.7	39.7	26.9
39	17	49,386	7.0	14.3	6.6	18.2	25.6	28.3
40	24	71,170	4.2	14.7	8.0	14.8	21.9	36.4
41	15	49,627	7.9	17.3	7.7	16.5	27.7	22.9
42	18	58,264	6.7	15.8	8.1	19.3	21.4	28.7
43	10	25,458	4.2	22.2	8.5	17.8	22.7	24.6
44	13	49,392	8.5	21.6	8.0	17.2	22.8	21.9
45	8	25,525	8.9	17.2	7.4	14.3	18.8	33.4
46	5	18,451	15.8	22.0	14.5	8.8	19.0	19.9
47	8	32,432	6.2	18.2	5.9	13.6	16.0	40.1
48	7	33,106	11.1	25.1	12.9	14.0	20.9	16.0
49	5	22,425	7.0	14.3	8.0	17.7	38.6	14.4
50	3	14,611	14.0	16.4	13.1	12.4	34.9	9.2
51	3	14,060	4.0	18.1	8.5	14.0	43.3	12.1
52	1	2,258	10.0	16.3	2.2	8.5	3.7	59.3
53	2	7,724	17.3	17.2	17.2	12.0	19.2	17.1
54	0	--	--	--	--	--	--	--
55	1	3,464	5.3	7.9	1.7	5.5	15.6	64.0
Total or average	1,484	1,981,499	3.5	10.3	4.3	12.0	26.5	43.4

Table 17.—Distribution of peeled logs by present Coast Douglas-fir grades as a percentage of new grades

Present grades	New grades				All logs	Logs
	1	2	3	4		
Number of logs	207	371	563	343	--	1,484
	Percent					*Number*
No. 1 Peeler	3	1	--	--	1	10
No. 2 Peeler	17	3	--	--	3	45
No. 3 Peeler	42	17	2	--	11	160
Special Peeler	20	12	1	--	6	93
No. 1 Sawmill	--	--	--	--	--	--
No. 2 Sawmill	18	66	66	16	48	712
No. 3 Sawmill	(1/)	1	31	84	31	464

1/ Less than 0.5 percent.

Table 18.—Distribution of peeled logs by new grades as percentage of present Coast Douglas-fir grades

Present grades	New grades				Logs
	1	2	3	4	
Number of logs	207	371	563	343	1,484
	Percent				*Number*
No. 1 Peeler	70	30	--	--	10
No. 2 Peeler	76	24	--	--	45
No. 3 Peeler	54	40	6	--	160
Special Peeler	44	48	8	--	93
No. 1 Sawmill	--	--	--	--	--
No. 2 Sawmill	5	35	52	8	712
No. 3 Sawmill	(1/)	(1/)	38	62	464
All logs	14	25	38	23	--

1/ Less than 0.5 percent.

Table 19.—Summary of regressions to estimate Coast Douglas-fir veneer grade yield percentages by new cruising grades[1] [2]

Log grade	Equation components and correlation coefficients	Veneer grade					
		A	A patch	B	B patch	C	D
1	a	-4.3970	3.9789	-1.4637	11.4281	69.4019	21.0518
	b_1	.3076	.3596	.2706	.0981	-.9505	-.0853
	R^2	12.6	7.5	15.7	6.0	26.1	2.3
2	a	-3.4911	-5.6803	-1.5951	1.6300	74.5566	34.5799
	b_1	.2264	.5702	.2036	.4154	-1.2537	-.1619
	R^2	15.7	22.4	11.4	13.7	22.4	(2/)
3	a	1.4894	4.6036	2.1044	-7.1942	82.5624	16.4343
	b_1	-.1643	-.5223	-.1819	.6403	-3.8282	4.0564
	b_2	.0053	.0178	.0057	-.0026	.0548	-.0810
	R^2	19.8	28.7	11.9	19.7	13.4	6.0
4	a	4.6437	.7599	-2.7078	-4.8265	13.4055	88.7251
	b_1	-.3976	-.1870	.2050	.3912	-.0111	-.0005
	b_2	.0097	.0095	-.0008	-.0008	-.0008	.0014
	R^2	13.4	25.5	10.9	15.2	(2/)	18.2
All log grades	a	2.8017	-3.3219	1.3517	-11.6706	63.3770	47.4622
	b_1	-.2839	.2096	-.1147	1.1307	-2.2236	1.2818
	b_2	.0088	.0059	.0060	-.0118	.0305	-.0394
	R^2	18.2	24.0	17.0	18.3	5.0	8.6

1/ To calculate the percentage of veneer in a log grade and diameter class, complete the equation: Percentage = $a(\pm)b_1$ (diameter) $(\pm)b_2$ (diameter)^2. For example: Percentage of A veneer in log grade No. 1 = -4.3970 + 0.3076 (log scaling diameter); Percentage of C veneer in log grade No. 3 = 82.5624 - 3.8282 (log scaling diameter) + 0.0548 (log scaling diameter)^2.

2/ All regressions are significant at the 5-percent level except for log grade No. 2 D veneer and log grade No. 4 C veneer.

THE NEW GRADING RULES

GENERAL SPECIFICATIONS

1. The grades are intended for 16-foot "log"[4/] lengths as commonly cruised in standing trees. If the cruise log length includes trim allowance, the specifications must be applied to the entire length.

2. The grades are not intended for application to cull logs (logs with more than a two-thirds cruise volume deduction).

3. Log diameter is not a specific grading criteria. The effect of log grade and size on value and product recovery is reflected in the tables.

4. Most of the grading specifications are applied by log "faces." A log face is one-quarter of the log circumference for the full length of the log.

5. A log adjacent to a cull log must be lowered one grade even if it meets specifications for grade 1, 2, or 3.

DEFINITIONS OF GRADING CHARACTERISTICS

1. *Knots* refer to sound, live, or dead limbs or limb stubs outside of knot cluster. Diameter of knot is measured at the log surface, inside the bark but outside the limb collar or swelling that may be present.

2. *Knot indicators* are bark distortions which indicate the presence of an underlying knot. Usually there is a small hole or depression in the center of the distortion. Indicator size is determined by the vertical diameter of the depression.

3. *Knot clusters* are three or more sound limbs or stubs, 1 inch or larger, in an inseparable group. The size of individual knots in a cluster is not considered.

4. *Cluster indicators* are three or more knot indicators, usually well defined by a distorted bark pattern and surface rise.

5. *Scars* are breaks in the normal bark pattern caused by injuries from fire, logging, frost, and lightning. They may be completely overgrown with callus tissue (old injuries), partially overgrown, or open (of recent origin). Their condition, location, and size determine whether they are *degrading* and therefore considered in the log grading specifications or superficial and disregarded.

[4/] The term "log" refers to designated sections of standing trees.

(a) *Degrading scars:*
A scar is considered to be degrading when the underlying wood is decayed, excessively pitchy, severely checked, or otherwise injured to the extent that lumber or veneer recovery would be affected.

(b) *Superficial scars:*
A superficial scar is a shallow, open, and sound injury of relatively recent origin that, in the judgment of the cruisers, will not affect lumber or veneer recovery and therefore is disregarded. Small scars--6 by 6 inches or less--whether open or overgrown, are also considered to be superficial *providing they do not contain rot or are not located in the lower 8 feet of the butt log* (see scar specifications for grades 1 and 2).

6. *Conks* are the fruiting bodies of fungi and indicate presence of interior rot.

7. *Cankers* are lesions characterized by distorted bark, callus tissue, and pitch flow. Common causes are mistletoe and rusts.

8. *Rotten knots* are live or dead limbs or stubs showing rot. Rotten or "punky" knots are treated the same as conks.

9. *Sound burls* are round or elliptical woody growths that protrude abruptly from the log surface with no evidence of decay or pitch.

10. *Unsound burls* are characterized by evidence of decay or heavy pitch or both.

11. *Bumps and bulges* are bark covered swellings on the log surface that do not conform to the normal taper or normal butt swell.

12. *Epicormic branches* are small, sprout-type limbs, that originate from dormant, usually 1/2-inch diameter or less, or adventitious buds.

13. *Holes* are the result of bird peckings or insect activity into the cambium.

APPLICATION OF GRADES

Cruisers (log graders) usually develop their own procedures for applying grading rules. Suggested steps are:

1. Size up each log with respect to knots, determining either the poorest (most shallow) or best (clearest) side.

2. Establish log grading faces based on the presence and character of any knots or indicators. Once the grading faces on a log are established, they cannot be shifted. Exception: see specifications for burls.

3. Apply knot or indicator specifications to determine preliminary grade of log; then apply other grading criteria such as scars, conks, etc., to establish final grade. For example, if the log is knot free, it is a potential grade No. 1. The grader would then look for other possible limiting characteristics to establish the final grade.

A Summary of Specifications for the New Timber Cruising Grades for Coast Douglas-fir

<table>
<tr><th>Log characteristic</th><th>Grade No. 1[1]</th><th>Grade No. 2[1]</th><th>Grade No. 3[1]</th><th>Grade No. 4</th></tr>
<tr><td>Knots (sound)</td><td>One allowed if 1 inch or less,
or
one larger than 1 inch if within 6 inches of log end.</td><td>None allowed on two faces. Knots larger than 2 inches must be confined to upper or lower half of one face.</td><td rowspan="2">Knots (sound or rotten) larger than 3 inches must be confined to one face.</td><td rowspan="11">Any merchantable log not meeting requirements for grade No. 3.</td></tr>
<tr><td>Rotten knots</td><td>None allowed.</td><td>None allowed unless log is otherwise grade No. 1.</td></tr>
<tr><td>Knot indicators</td><td>If larger than 1 inch, must be confined to no more than two faces.</td><td colspan="2">No requirements.</td></tr>
<tr><td>Knot clusters</td><td>None allowed.</td><td>One if confined to one face.</td><td>Any number if confined to no more than two faces.</td></tr>
<tr><td>Knot indicator clusters</td><td>One if confined to one face.</td><td colspan="2">No requirements.</td></tr>
<tr><td>Scars</td><td>None allowed from ground line to 8 ft. Above 8 ft.: no limit for <u>sound</u> scars 6"x6" or smaller, larger <u>sound</u> scars must be confined either to one face or not more than two faces in any 1/4 of log length. No rotten scars allowed.</td><td>All scars having rot must be confined to one face.</td><td>No requirements.</td></tr>
<tr><td rowspan="2">Sound burls[2]</td><td colspan="3">Disregard burls if less than 6 inches in diameter.</td></tr>
<tr><td>If larger than 6-inch diameter, must be confined to one face.</td><td colspan="2">All larger than 6 inches must be confined to three faces.</td></tr>
<tr><td>Conks, cankers, and unsound burls</td><td>None allowed</td><td>None allowed unless log is otherwise grade No. 1.</td><td>No requirements.</td></tr>
<tr><td>Bumps and bulges</td><td>None 6"x6" or larger allowed from ground line to 8 feet. No requirement above 8 feet.</td><td colspan="2" rowspan="2">No requirements.</td></tr>
<tr><td>Epicormic branches and holes</td><td>Must be confined to one face.</td></tr>
</table>

[1] A log meeting specifications for either grade No. 1, 2, or 3 is lowered one grade if adjacent to a cull log.

[2] When burls are considered, log faces can be shifted from the faces initially established for knots or other characteristics.

Woodfin, Richard O., Jr.
1974. Veneer yields by the new timber cruising grades for old-growth Coast Douglas-fir. USDA For. Serv. Res. Pap. PNW-174, 34 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Veneer yields are reported for old-growth Coast Douglas-fir by the new cruising log grades. Studies made at 10 veneer mills in Washington, Oregon, and California produced approximately 2 million square feet, 3/8-inch basis, of veneer. Veneer yield tables and curves are provided, and an example for estimating yields based on the new grades is given. Data are presented on a short log basis (the log is a combination of successive peeler blocks).

Keywords: Douglas-fir, veneer/plywood mill products, log grading, cruising (forest).

Woodfin, Richard O., Jr.
1974. Veneer yields by the new timber cruising grades for old-growth Coast Douglas-fir. USDA For. Serv. Res. Pap. PNW-174, 34 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Veneer yields are reported for old-growth Coast Douglas-fir by the new cruising log grades. Studies made at 10 veneer mills in Washington, Oregon, and California produced approximately 2 million square feet, 3/8-inch basis, of veneer. Veneer yield tables and curves are provided, and an example for estimating yields based on the new grades is given. Data are presented on a short log basis (the log is a combination of successive peeler blocks).

Keywords: Douglas-fir, veneer/plywood mill products, log grading, cruising (forest).

Woodfin, Richard O., Jr.
1974. Veneer yields by the new timber cruising grades for old-growth Coast Douglas-fir. USDA For. Serv. Res. Pap. PNW-174, 34 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Veneer yields are reported for old-growth Coast Douglas-fir by the new cruising log grades. Studies made at 10 veneer mills in Washington, Oregon, and California produced approximately 2 million square feet, 3/8-inch basis, of veneer. Veneer yield tables and curves are provided, and an example for estimating yields based on the new grades is given. Data are presented on a short log basis (the log is a combination of successive peeler blocks).

Keywords: Douglas-fir, veneer/plywood mill products, log grading, cruising (forest).

Woodfin, Richard O., Jr.
1974. Veneer yields by the new timber cruising grades for old-growth Coast Douglas-fir. USDA For. Serv. Res. Pap. PNW-174, 34 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Veneer yields are reported for old-growth Coast Douglas-fir by the new cruising log grades. Studies made at 10 veneer mills in Washington, Oregon, and California produced approximately 2 million square feet, 3/8-inch basis, of veneer. Veneer yield tables and curves are provided, and an example for estimating yields based on the new grades is given. Data are presented on a short log basis (the log is a combination of successive peeler blocks).

Keywords: Douglas-fir, veneer/plywood mill products, log grading, cruising (forest).

The mission of the PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION is to provide the knowledge, technology, and alternatives for present and future protection, management, and use of forest, range, and related environments.

Within this overall mission, the Station conducts and stimulates research to facilitate and to accelerate progress toward the following goals:

1. Providing safe and efficient technology for inventory, protection, and use of resources.
2. Development and evaluation of alternative methods and levels of resource management.
3. Achievement of optimum sustained resource productivity consistent with maintaining a high quality forest environment.

The area of research encompasses Oregon, Washington, Alaska, and, in some cases, California, Hawaii, the Western States, and the Nation. Results of the research will be made available promptly. Project headquarters are at:

Fairbanks, Alaska
Juneau, Alaska
Bend, Oregon
Corvallis, Oregon
La Grande, Oregon
Portland, Oregon
Olympia, Washington
Seattle, Washington
Wenatchee, Washington

Mailing address: Pacific Northwest Forest and Range Experiment Station
P.O. Box 3141
Portland, Oregon 97208

GPO 990-826

The FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.